

A NEW NORTH AMERICAN SPECIES OF PULVINARIA¹
(Homoptera, Coccidae)

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This scale is described at this time to provide a name for a new species that now appears to be native to North America and may become an economic pest of azaleas and *Rhododendron*.

Pulvinaria ericicola, new species

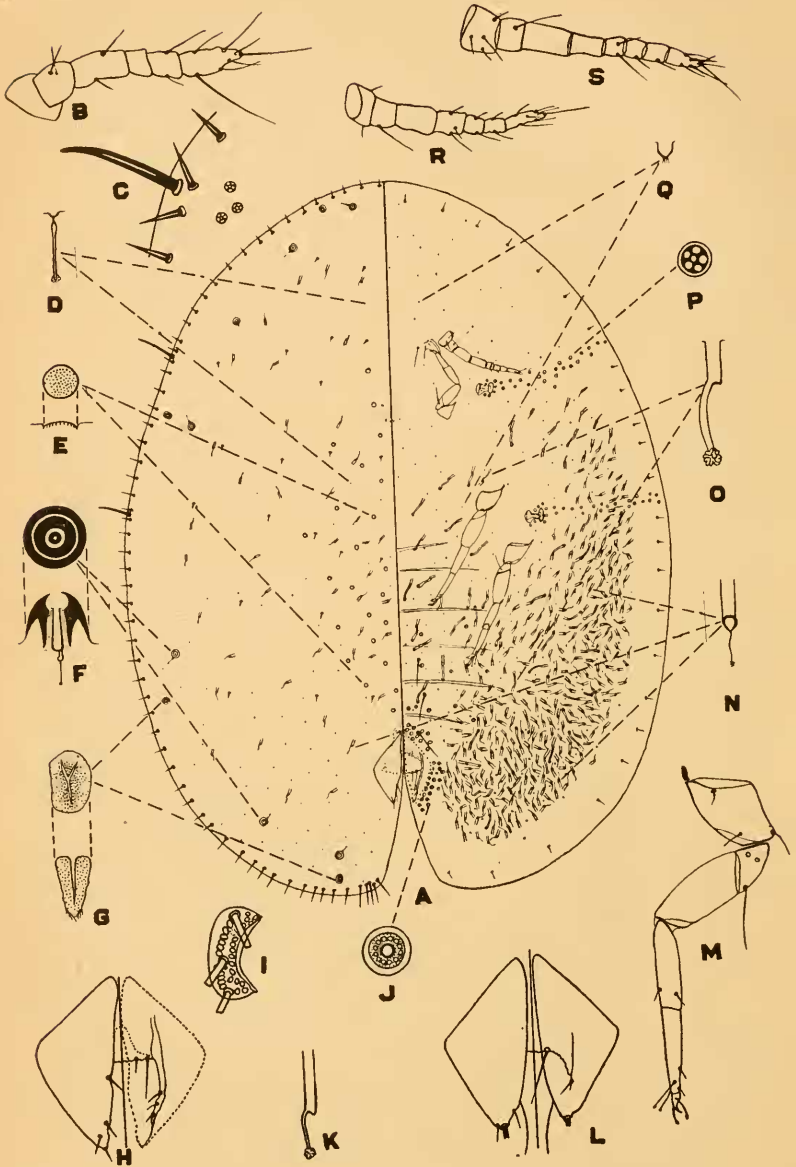
Adult female unmounted and before formation of the ovisac, elongate oval, about one and one-half times as long as wide, derm reddish brown covered with closely spaced platelets of glassy wax. Fully mature females more rounded, widest in abdominal area, rather flat, wax plates more widely spaced, becoming yellowish in color. The completed ovisac two to four times as long as the scale, and usually elevating the posterior part of the abdomen. At full maturity 2-2.5 mm. wide and 2.5-3 mm. long.

Adult female mounted (fig. A—all morphological details not drawn to same scale as outline), similar in shape and size to unmounted individuals. The derm not heavily sclerotized at full maturity but clear oval areas become more or less evident.

Marginal setae (fig. C) large, stout and straight, gradually tapered to an acute point, non-fimbriate, 100 to 125 in number, those near anal lobes 30 to 50 microns long, and those on other areas of the body 18 to 25 microns in length. Ventral submarginal setae about half the number of marginal setae, short and slender, 8 to 12 microns in length. Three stigmatic setae (fig. C), the middle one large, gently tapered to a well rounded point, apex curved, two to four times as long as the other two which are similar to the marginal setae in shape and size, frequently somewhat less acutely pointed. Body setae few in number, scattered over both surfaces, most of them small; some on dorsal surface short and stout, peglike; three long ventral pairs, 60-75 microns in length, the posterior pair frequently obscured by the anal plates in slide mounts; and a group of 2 to 4 mesal to each antenna, varying in length from 10 to 35 microns.

Anal plates quadrate (fig. H), slightly longer than wide, caudolateral and cephalolateral sides approximately equal in length, with the lateral angle well rounded; apices of each plate rather pointed with two apical setae, two on posterior mesal margin, and two or three subapical setae; two fringe setae on each side, the outer one large and prominent, two to three times as long as the inner one; without hypopygial setae; ventral ridge only faintly indicated. Anal ring (fig. I) normally with three large setae on each half, 95 to 120 microns in length, occasionally one or two, much smaller and shorter setae present.

¹Scientific Article No. 1205. Contribution No. 2122 of the Maryland Agricultural Experiment Station (Entomology Department).



Legs (fig. M) small and rather slender without a tibio-tarsal articulation; tarsus usually as long as or longer than tibia; claws small, strongly curved; tarsal digitules long and slender, knobbed at the distal end; claw digitules about two times as long as claw, slender, with the distal ends spatulate. Antennae (fig. S) 8-segmented, not unusual in appearance; third segment longest, fourth and eight segments somewhat shorter, and much narrower; first, second, fifth, sixth and seventh segments still shorter and all these subequal in length; eighth segment with several long setae; setae on other segments vary from long to short.

Stigmatic depressions only weakly, if at all indicated, stigmatic quinquelocular disc pores (fig. P) 20-30 in number arranged in an irregular band 1 to 2 pores wide between stigmatic setae and spiracles. Multilocular disc pores (fig. J) present in considerable numbers in the genital area, and a few in transverse segmental rows on the posterior part of the abdomen. Dorsal pores (fig. E) very large and prominent, approximately 50 in number, about 12 microns in diameter, flat, disc-like with depressed margins, present from the anal plates to the area above the tentorial structure, frequently arranged in two definite groups one on each side of the midline, occasionally rather widely scattered.

Tubular ducts of two types, one very small, and one much larger, hereafter referred to for convenience as microtubular ducts and macro-tubular ducts; the microtubular ducts of two kinds, one evenly distributed on dorsal surface (fig. D) with a very short, heavily sclerotized disc-like tube, one and one-half microns in diameter, and a very delicate filament 6 to 10 microns long, usually one in each clear area when these areas are evident; the other kind (fig. Q) of microtubular ducts uniformly distributed on ventral surface considerably larger with a longer tube and a short inner prolongation of indefinite structure; macro-tubular ducts of two kinds, both principally on the ventral surface, both with rather long ducts, and thick walled cups, one kind with a large filament (fig. O), and a bulbous enlargement at the distal end, and the other

PLATE 5. PULVINARIA ERICICOLA

A, adult female-general outline $\times 40$; B, larva—antenna $\times 175$; C, adult female—stigmatic and nearby marginal setae $\times 175$; D, adult female—dorsal microtubular duct $\times 670$; E, adult female—dorsal pore $\times 330$; F, adult female—dorsal submarginal tubercle $\times 525$; G, adult female—dorsal submarginal sclerotized pore $\times 330$; H, adult female—anal plates, left dorsal, right ventral view $\times 140$; I, adult female—anal ring left half $\times 175$; J, adult female—multilocular disc pore $\times 330$; K, second stage male—submarginal tubular duct $\times 330$; L, larva—anal plates, left dorsal, right ventral view $\times 380$; M, adult female—hind leg $\times 140$; N, adult female—macro-tubular duct $\times 330$; O, adult female—macro-tubular duct $\times 330$; P, adult female—quinquelocular disc pore $\times 330$; Q, adult female—ventral microtubular duct $\times 670$; R, second stage male—antenna $\times 155$; S, adult female—antenna $\times 140$.

with a tiny filament (fig. N) and a slight enlargement at the distal end, 12 to 15 times as numerous as the former, a few of these also scattered over the dorsal surface; the two kinds of ducts intermingled to form a wide ventral band of closely spaced ducts on each half of the body extending from the anal lobes to the area between the two pairs of spiracles, and only a few scattered on the median areas; a narrow ventral submarginal area entirely devoid of tubular ducts.

Dorsal submarginal tubercles (fig. F) always present, 8 to 17 in number, large and prominent, the central tubular portion with a filamentous inner prolongation. Arranged in a row between the dorsal submarginal tubercles and the marginal setae, are usually 6 to 10 heavily sclerotized pores (fig. G) with a surface opening of variable shape, apparently without secretory functions, occurring principally on the anal lobes and near anterior margin, and occasionally on the lateral areas, sometimes absent, or unrecognizable.

Second stage male. Only mounted specimens available for study, 1.8 to 2.2 mm. long and 1 to 1.2 mm. wide; marginal setae similar in shape to those of the adult female but slightly smaller and fewer in number, several specimens average about 85; ventral submarginal row of setae, short and slender about half the number of marginal setae; spiracular setae similar to those of adult female; three pairs of long setae on the posterior midventral area of the abdomen, one long and one short seta mesal to the base of each antenna, a few tiny setae scattered over both surfaces; antennae (fig. R) seven segmented; anal ring with six setae.

Microtubular ducts similar to those of adults (figs. D and Q); ventral submarginal macro-tubular ducts (fig. K), about 40 in number, present on the head, thorax, and anterior part of the abdomen, differing from other macro-tubular ducts in that the tube is nearly two times as long as the filament, cup more prominent, with the inner half of the tube more heavily sclerotized, as evidenced by the staining reaction, the outer half thin and membranous, internal filament small and delicate with a prominent bulbous ending; a few macroducts (figs. O and N) similar to those of adult females on the ventral surface.

Intermediate stage female. Only two mounted specimens available for study, average 1.3 mm. long and 0.85 mm. wide; similar to female, differing principally in the following particulars; smaller, without multilocular disc pores, without dorsal pores, only a few macro-tubular ducts (figs. O and N) on the ventral surface; legs smaller, antennae shorter and more tapered, with 6-8 submarginal tubercles, similar to those of the adult female.

Larva. Body elongate oval; antennae (fig. B) 6-segmented, stout; legs short and stout, both tarsal and claw digitules long, slender, thread-like, claws long and slender; body margin with rather long, delicate, acutely pointed setae; spiracular setae three in number, the middle one long and stout, the other two stouter than marginal setae; one to three

small quinquilocular pores between spiracles and marginal spiracular spines; anal plates (fig. L) somewhat triangular, with three apical setae, one about half as long as the body and the other two very small, one subapical seta, and one rather large fringe seta; anal ring with six setae.

Type locality.—College Park, Maryland.

Type host.—*Rhododendron nudiflorum*.

Holotype.—Young adult female collected at College Park, Maryland Apr. 24, 1930 and deposited in the National Coccid Collection.

Paratypes as follows: collected by T. Pergande, Washington, D. C. on *Rhododendron nudiflorum* Sept. 6, 1896; by H. S. McConnell at College Park, Maryland on *Rhododendron nudiflorum*, Apr. 24, 1930 and June 21, 1938; by S. W. Bromley, Poughkeepsie, New York on *Rhododendron molles*, June 21, 1947; by Hamilton and Smith, Poughkeepsie, New York on *Rhododendron molles* Oct. 13, 1947, and on *Rhododendron* sp. Oct. 14, 1947; and by D. W. Hamilton, Poughkeepsie, N. Y. on *Rhododendron molles* and *R. Kaempferi* Apr. 26, 1948.

In addition to the above collections the following material has been studied, one slide in the U. S. Nat. Collection labeled, "Blueberry," Oldmar, Fla., P. Thomas, Feb. 5, 1921, and a lot collected on azalea (*Rhododendron*) in Baltimore, Md., May 25, 1948.

The large straight, evenly tapered, acutely pointed marginal setae of this species will separate it from any other known to the author, especially *P. innumerabilis* (Rathvon) which has marginal setae about the same size at the base, but they are thick, spikelike, only slightly tapered, and with blunt more or less rounded apex. Two other species, *P. bigeloviae* Ckll. and *P. ericae* (Löw), have evenly tapered, acutely pointed marginal setae but they are much smaller, and in the case of *P. bigeloviae* are arranged in a more or less double or irregular row.

Several years ago some histological preparations were made of adult females of this scale in an effort to clarify the nature of the various dermal structures. These studies were not completed, but some information was secured which has been incorporated in several of the above illustrations.

The illustration of the submarginal tubercle (fig. F) was prepared in part from histological sections; however, some details are still not clear. For instance, it has not been possible to demonstrate the relationship of the central cylinder with the filamentous prolongation, to the heavily sclerotized part of the structure. The dotted line was inserted to indicate the most probable connection between the two but this has not been satisfactorily demonstrated. The histological sections of

these tubercles show a large glandular cell attached to the base of the central cylinder with the filamentous prolongation imbedded in the cell. If there were other specialized hypodermal cells associated with the tubercles they had atrophied before the preparations were made. The dorsal pore (fig. E) illustration was also prepared in part from histological sections, and there is no evidence of specialized hypodermal cells associated with it. It is possible here again that specialized cells could have been present at one time, and had atrophied. The glandular cells associated with the two kinds of macro-tubular ducts (figs. O and N) serve to emphasize the morphological differences between these two structures.

The structures referred to above as "sclerotized submarginal pores," apparently have not been noted in other species of lecanine scales, unless they are the same as the "degenerate or aborted submarginal ducts" of *Lecanium coryli* (L.) (*L. corni* Bouché of American authors) which occur in that species sometimes according to Sulc: Československe druhy rodu puklice—gn. *Lecanium* Coccidae Homoptera (Die tschechoslowakischen *Lecanium*—arten); Acta Societatis Scientiarum Naturalium Movaricae, Fig. 5, Page 24, 1932. In the case of *Pulvinaria crivicola*, it hardly seems probable that these "pores" can be degenerate or aborted submarginal tubercles since when present they occur in a different submarginal plane to that normally occupied by the submarginal tubercles.

This species has been under observation for several years at College Park, Maryland, on *Rhododendron nudiflorum*, and *R. viscosum* growing in their native habitats in a large wooded area. Almost invariably they are found near the base of the plants below the ground cover of leaves and leaf mould. Notes on file in the Bureau of Entomology and Plant Quarantine accompanying the Pergande collections of 1896 indicate the infestation was on the roots of the plants. The infestations on *Rhododendron molles* and *R. Kaempferi* at Poughkeepsie, N. Y. and that on *Rhododendron* sp. from Baltimore, Md. occur on the upper portion of the plants.

The scales overwinter as fertile, but not fully grown adult females. Ovisac formation and egg deposition begins in June at College Park, Md. When the eggs hatch, they settle along the stems of *R. nudiflorum*, both below and above the ground cover. However, in this area practically all those above the ground cover succumb to parasites. To date, only one generation has been observed.